Energy Saving Opportunities at DoD Industrial Facilities

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Co-sponsors: DoD and IEA

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Presentation Outline:

Process Energy Optimization (PEO)

- Introduction, PEO Objectives and Goals
- ETSI's PEO Features and Benefits
- 4 PEO Assessments, 8 Example Results
- Summary and Conclusions

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A Little of Our History on PEO

- Our 1985 Focus on Energy Efficiency…
- The Problem: No One was really listening….
- The New Direction: Combine w/ Process…
- The Birth of PEO: We are PEO Experts
- 20 Years Later: PEO, the $$ Saving Machine
- We have completed >160 PEOs over 20 years
- 22 PEO Assessments Completed in 2004

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PEO Objectives for DoD Fac.

- Reduce energy **and** other operating costs by improving DoD processes to fully satisfy the requirements of the “Warfighter” customer
- Use the strengths of the PEO approach to focus on the big $$ problems and opportunities, to change what really matters and to do it fast.
- Complement and enhance the DoD’s ongoing Lean, Six Sigma and/or Airspeed initiatives throughout the DoD.

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Warfighter Requirements*

- Reduce Cycle Time from 90 days to 45 days
- Increase “Surge” Capability of Depot Output
- Reduced Depot Work-In-Process (WIP) Inventory
- Reduced Operating Expenses for “$$ that Matter”
- Improved Scheduling Accuracy: Make it reliable
- Reduced Number of Assets in Depot Pipeline

***Reference: “Airspeed includes all aspects of Lean”**
by D. Nedresky, Network Magazine, October 2003
Note: Warfighter = soldier, sailor, pilot and machine

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PEO Goals & Expectations

- ID solutions to lower the annual energy and environmental costs by **15 -20%** for the **targeted** processes.
- Use energy to ID solutions to ***further*** reduce annual wasted $$ in ***Depot processes*** by **2-5 X** the “energy only” savings.

Depot Example: $500 mil budget, $10 mil energy

Savings: Energy= $1.5 mil, Process= $3-7mil/yr

Savings results are judged by the Depot Team.

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NADEP North Island Results

"In a matter of a few weeks of intense onsite discovery efforts, **194** Process and Energy Optimization (PEO) measures were **identified** and **54** were **quantified** with supporting economics. **Savings = $5,530,000 per year, Capital cost = $7,820,000**

Simple Payback = 1.4years

Jose Jiminez, NADEP North Island Project Leader / POC 1998

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PEO Features and Benefits

Features (Concepts)	Benefits to You & the Fac.
Integrates Process and Energy	Lowers Unit Cost of Finished Product
Involves Depot Key People	Better Solutions, Commit to Implement
Focuses on Critical Cost Issues	Saves Time, Maximizes Results
Uses Financial & Technical Tools	Higher $ Quantity and Quality Solutions
Creates Immediate $$ Results	Jump Starts Program, Instant Credibility
Generates User Friendly Report	Quickly Present and Implement Solutions

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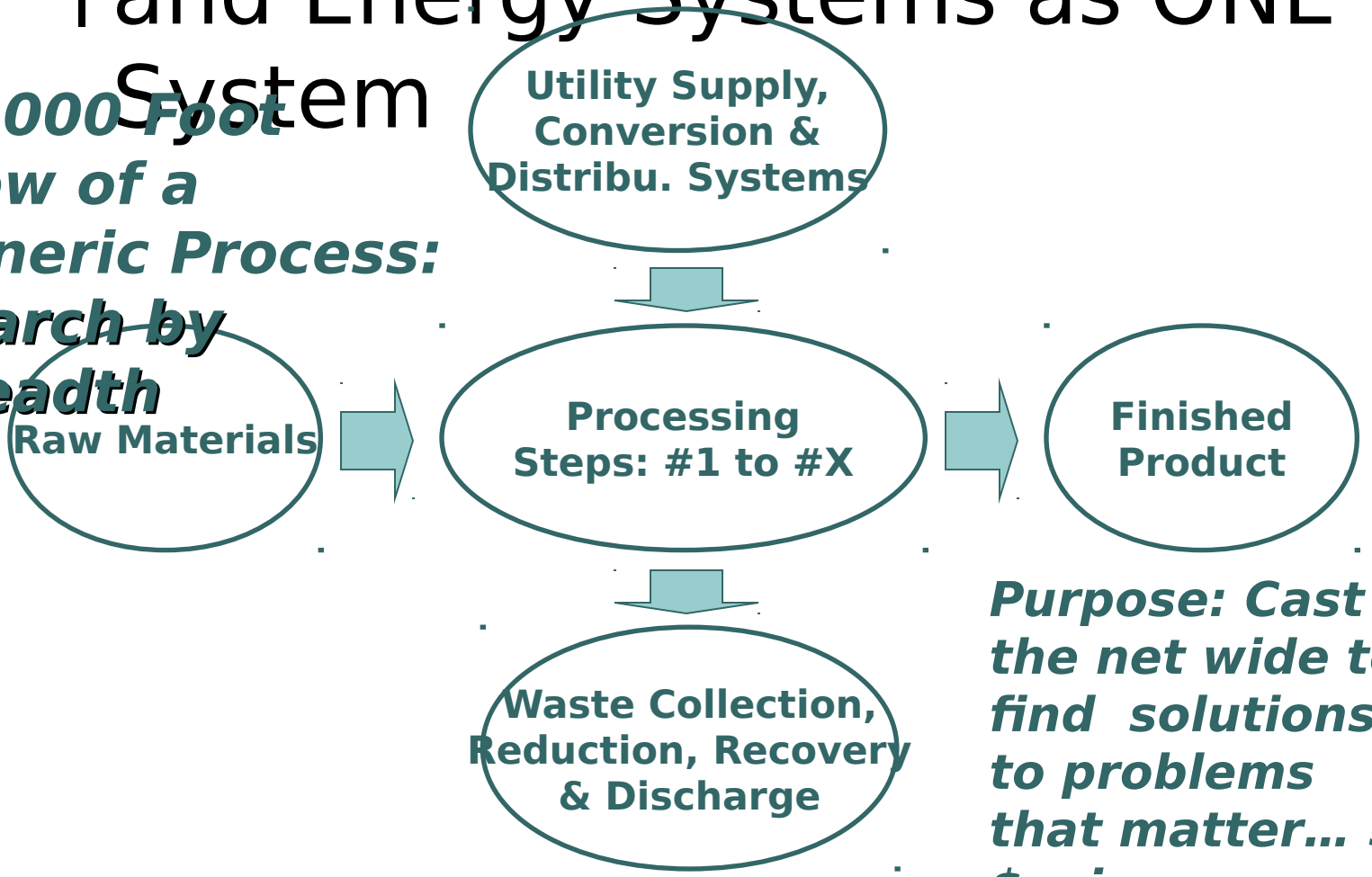
Concept One: Integrate Process and Energy Systems as ONE System

30,000 Foot View of a Generic Process: Search by Breadth


Utility Supply, Conversion & Distribu. Systems
Raw Materials
Processing Steps: #1 to #X
Finished Product
Waste Collection, Reduction, Recovery & Discharge

Purpose: Cast the net wide to find solutions to problems that matter… $ $-wise

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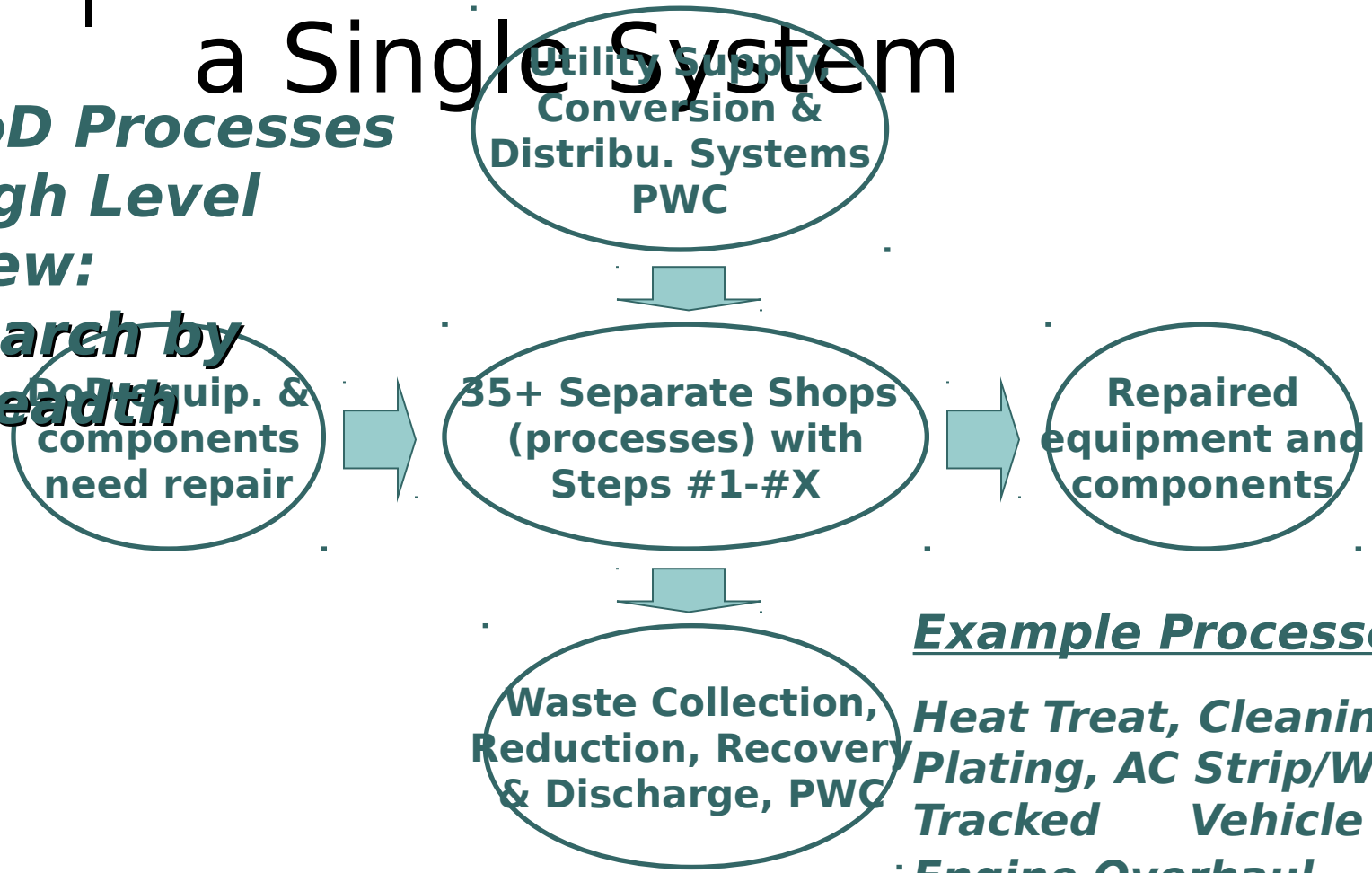
Integrate Process and Energy Systems as a Single System

DoD Processes High Level View: Search by Breadth


Utility Supply, Conversion & Distribu. Systems PWC
DoD equip. & components need repair
35+ Separate Shops (processes) with Steps #1-#X
Repaired equipment and components
Waste Collection, Reduction, Recovery & Discharge, PWC

Example Processes:

Heat Treat, Cleaning, Plating, AC Strip/Wash, Tracked Vehicle and Engine Overhaul

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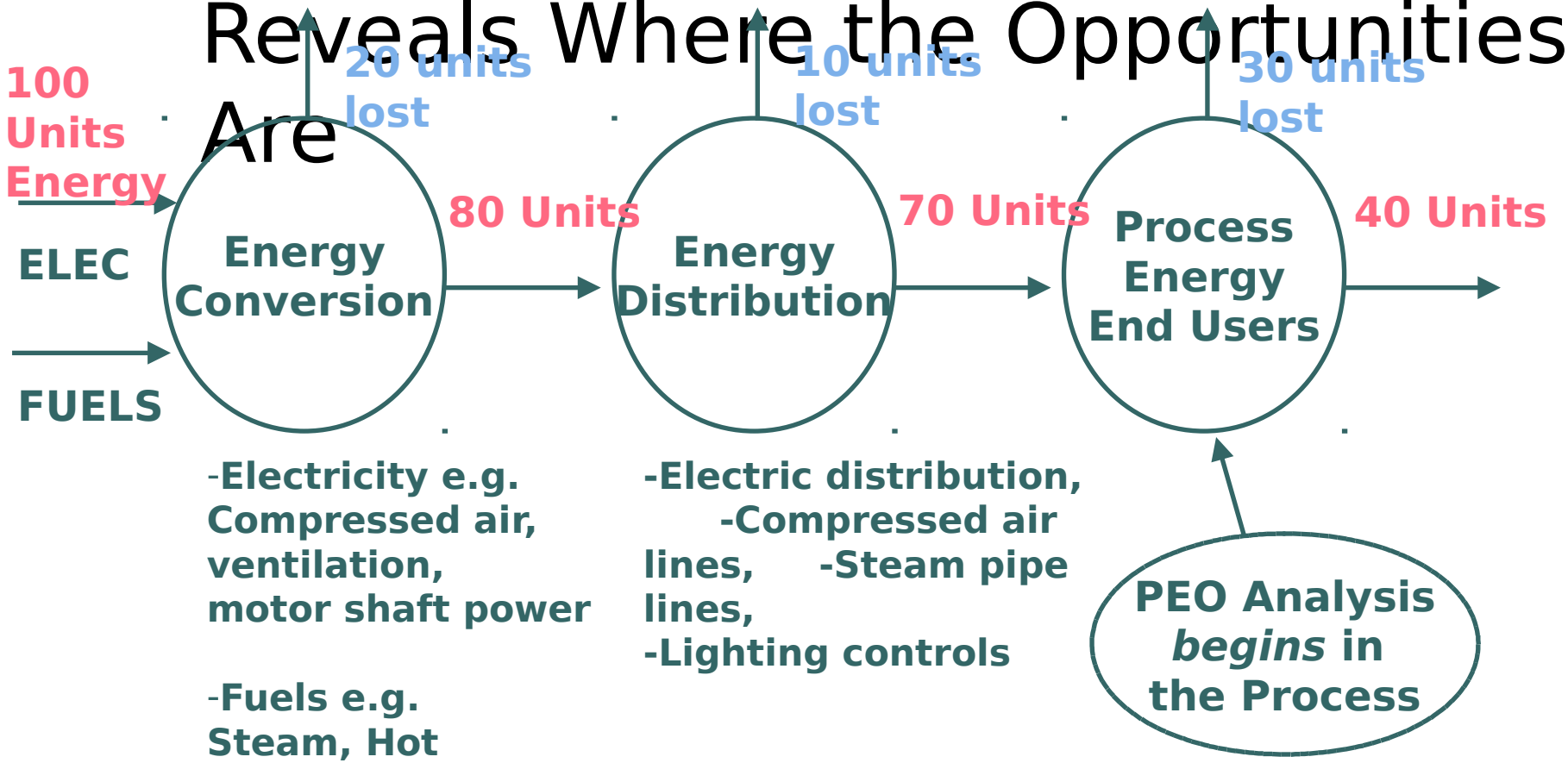
Integration of Process and Energy Reveals Where the Opportunities Are



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Integrating Process and Energy

- Identifies Legitimate Process Energy Loads
- Uses Energy and Other Means **to Improve:**
  - + Utilization of Raw Materials (less scrap/waste)
  - + Tracked Vehicle or Aircraft Cycle Time (CT)
  - + Equipment & Components Quality/Safety
  - + Labor Utilization (morale) and Lower Emissions

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Integrating Process and Energy

Benefits:

- Maximizes Opportunities for Savings
- Lowers Cost of Delivered Product/Service
- Improves Your Value to the Organization
- Your DoD Fac. Is Now More Competitive

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Integrating Process and Energy

PEO Enhances your Existing PI* Initiatives

- **PEO complements Lean, 5Ss and Six Sigma**
- **PEO adds value to Process Improvement Teams**
- **PEO ‘speed’ can accelerate PI (done in days not mos)**
- **PEO loves AIRSPEED ‘thinkers’**
- **PEO hates WASTE (Materials + Labor + Output + $$)**

* PI is short for “Process Improvement”

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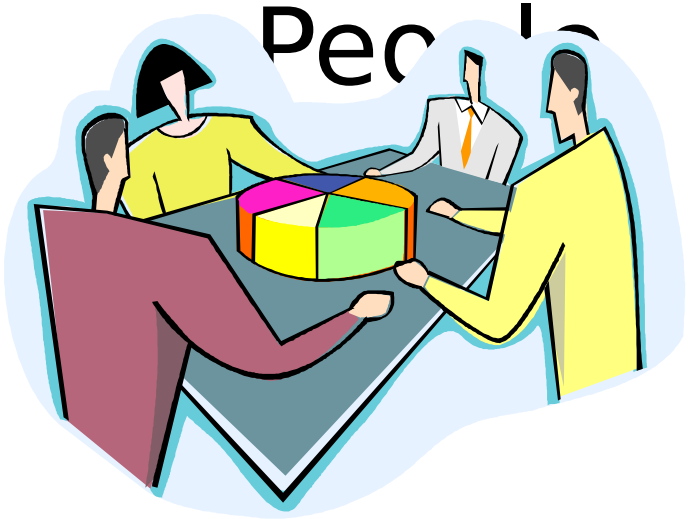
Concept Two: Very Important ! PEO Involves Your Key People



- Process Improvement Thinkers
- Shop-Floor Veterans
- Quality Control/Scheduling
- Cost Analysis & Control
- Facility Management
- PWC/DPW Energy Systems
- Process Engineering
- Maintenance Expertise

Involves Key People ***ONLY*** *on an* ***'AS NEEDED'*** *basis.*

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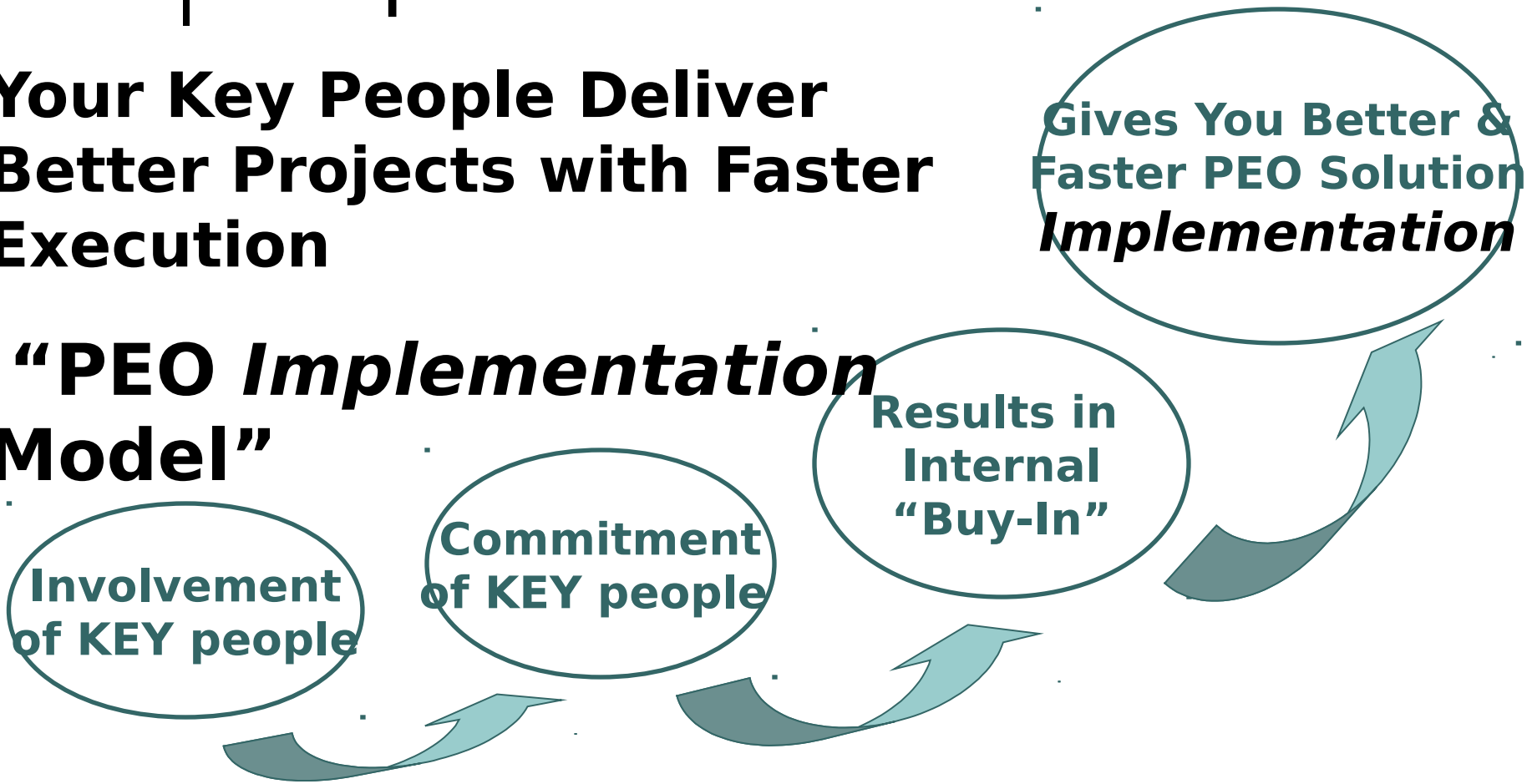
Why Involve Your Key People?

Your Key People Deliver Better Projects with Faster Execution

"PEO *Implementation* Model"


Involvement of KEY people
Commitment of KEY people
Results in Internal "Buy-In"
Gives You Better & Faster PEO Solution *Implementation*

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Involves Your Key People

Benefits:

- Best use of everyone's time-on as needed basis
- Better quantity (2X) and quality of solutions
- Involvement produces practical* solutions
- Results are implemented in half the time

*judged buy Depot participants, not consultants

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Concept Three: Focus Only on Critical Cost Issues (CCIs)

- Areas of Waste and Missed Opportunity
- Focuses on What Financially Matters
- Work **Only On** the “top” Critical Cost Issues
- The Depot sets the Scope of Work by Selecting the Target CCIs and their respective Processes

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Focus on Critical Cost Issues

Benefits:

- Saves You and Your Team Time ($$$)
- Energizes Team to Make a $$ Difference
- Helps Your DOD Fac. Stay Competitive
- Maximizes Your Financial Results

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Hypothetical DoD CCIs

What is the CCI?	Where is the CCI?	Cost ($/yr)
Energy System Losses	Distribution System “A”, End User “B”	? $
Cycle Time Problems	Ops Schedule, Bottlenecks in “Shop C”	? $
Reliability Problems	Machine “D”, Process Area “E”	? $
Ineffic. Comp. Air Sys	Shops “F and G”, Systems 3 and 5	? $
Environmental Issues	Emissions/Wastewater in Process “H”	? $

What CCIs come to mind at Your DoD Fac.?

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Focuses on Critical Cost Issues

Rock Island Arsenal CCI Example

Critical equipment in Foundry has out lived its economic life. A $354k/year problem!

- Excessive downtime, high maintenance
- High energy and and materials cost
- Major production bottleneck

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Concept Four: ETSI's Special Financial & Technical Tools

- Uses Unique Financial Modeling (10% what ifs)
- IDs the "Cost Equation" for the CCI (k$/year)
- Develops One Line Balances (OLBs)
- Simplifies Process Flow Understanding (PFD)
- Brainstorming Produces Best Solutions
- Clear Calculations of Solution Economics

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Uses Financial & Technical Tools

Benefits:

- Gets Everyone's Head in the Game
- "SIG" Produces More Ideas Faster
- Creates Higher $$ Impact Solutions
- Able to Better Quantify Solutions

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Uses Financial & Technical Tools

NADEP North Island Example

Effectively analyzed the combined value of energy, environmental and TAT (k$/yr) from installing a ‘closed-loop’ vapor solvent cleaner in the Cleaning Department.

- Net Savings = $242k/yr
- Total Capital Cost = $500k
- Simple Payback = 2.1 years

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Concept Five: Creates Immediate $$ Results

- No-Cost Solutions (SDs)
- Low-Cost Solutions (LUs)
- Very Practical Solutions

(Judged by Depot Team)

- Credible Economics

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Creates Immediate $$ Results

Benefits:

- Jump Starts Program… Savings Start Now
- Enhances and Provides “Lift” to Airspeed
- Enables Depot to Package Projects
- Quickly Provides PEO Team Credibility

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Creates Immediate $$ Results

Fort Leonard Wood Example:

Reduce fuel cost to the four Heating Plants by substituting No. 2 fuel oil for NG and propane.

- Savings= $1,019 k/yr
- Capital Cost= $0 k
- Payback = Immediate

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Creates Immediate $$ Results

Fort Leonard Wood Example:

"Group" re-lamp rather than "spot" re-lamp

90% of the 9 million sq ft of facilities

- Savings= $306 k/yr
- Capital Cost= $0 k
- Payback = Immediate

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Creates Immediate $$ Results

NADEP North Island Example:

Identified ‘no-cost’ opportunities to reduce weekend and night time energy loads for 10 buildings.

- Savings= $92 k/yr
- Capital Cost= $0 k
- Payback = Immediate

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Creates Investment Opportunities

Fort Leonard Wood Example:

Re-activate Fac.-wide EMCS to shed 2MW of electric loads from 40MW peak.

- Savings= $155 k/yr
- Capital Cost= $50 k
- Payback = 0.3 years

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Creates Investment Opportunities

Fort Leonard Wood Example:

Install VFDs on Laundry extractor motors to optimize cycle time for a 5% output increase.

- Savings = $155 k/yr
- Capital Cost = $50 k
- Payback = 0.3 years

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Creates Investment Opportunities

Fort Carson Example:

Replace “once thru” city water cooling on Sullair air compressor with small closed loop system .

- Savings = $12 k/yr
- Capital Cost = $4 k
- Payback = 0.3 years

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Generates User Friendly Report

Sample EOM* and POM* “Write-Up” Outline

- Title / Facility / Area
- Background of Issue/Opportunity (base case)
- Descriptive Scope of Work (what changes?)
- List of Operating and Economic Assumptions
- Budget Savings and Cost Calculations
- Summary Results Table

* **EOM** =EG. Opt. Measure, * **POM** = Proc. Opt. Measure

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Summary: PEO in Three Words

Focus	**Only Work on Critical Cost Issues**
Change	**Solutions that Financially Matter**
Speed	**Approximately 1-6 weeks Onsite**

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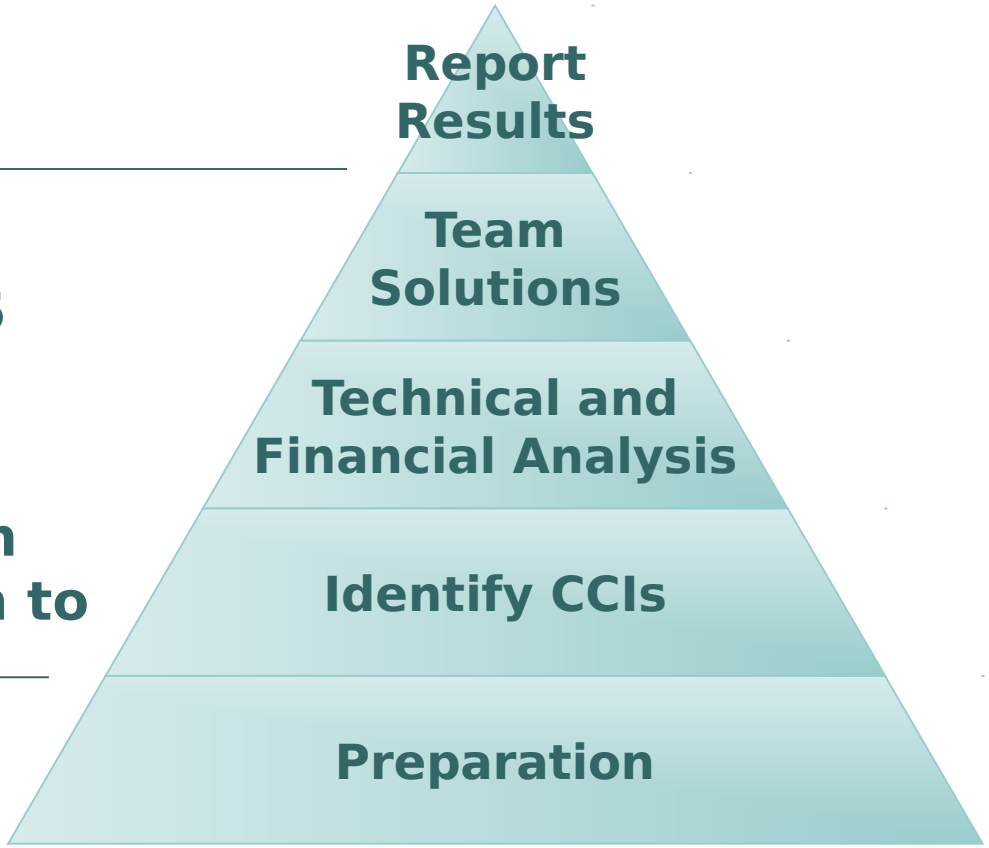
Summary: Typical Timelines

Draft report delivered within 6 weeks of last day onsite

Done in 1-6 weeks of onsite time over a 3-6 month period

Last day of each work session concludes with summary presentation to management

ETSI prep starts 1-2 months prior to onsite



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Example Military PEO Assessments

Re-Manufacture & Maintenance Facilities

Army	**Navy**
Pine Bluff Arsenal, AR	NADEP North Island, CA
Watervliet Arsenal, NY	Norfolk Naval Shipyard, VA
Ft. Leonard Wood, MO	Crane Navy Base, IN
Fort Carson, CO	NADEP JAX, FL (Jan-July 2004)
Rock Island Arsenal, IL	
Corpus Christi, TX	

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